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ORD-3362-67

12 July 1967

MEMORANDUM FOR: SA/D/E

SUBJECT: History of Analysis Division/ORD

1. The Analysis Division is the most recently formed division within ORD. One of the prime considerations in its formation was the following: the advanced technical collection systems under development in many of the other ORD divisions would ultimately provide a large volume of highly technical raw data. These data must be processed and significant intelligence (e.g. signals, patterns, changes, etc.) extracted. It was apparent for reasons of speed, accuracy, and efficiency that such data processing would be performed in an automatic or semi-automatic way. Also the Analysis Division would provide R&D support to a variety of consumers within the Agency in accordance with the general ORD mission. Hence, the Analysis group was to be, and is, polarized about computers and computer-oriented processes.

2. The first professional employee of the Analysis Division and its chief throughout its history is [redacted] 25X1A9a EOD'd with the Agency on 28 June 1964, which can be taken as the formal inception of Analysis Division activities. It has been primarily [redacted] 25X1A9a who has provided the planning and thrust of the Analysis Division program.

3. By mid 1965 the "data indigestion problem" was becoming increasingly evident to key officials in the intelligence community. This problem can be summarized as follows: the volume of raw intelligence data inputs of various sorts (overt publications, CS reports, reconnaisance and other types of photography, waveform data etc.) continues to increase. Intelligence analysis resources

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available, both manpower and money, are asymptotically approaching limits. Intelligence to be useful must be timely. Hence, automatic and semi-automatic procedures must be developed to aid the intelligence analyst in the performance of his duties. These considerations were emphasized in the recommendations of the PFIAB Communications Panel (memorandum from McGeorge Bundy to DCI, 15 July 1965 - Subject: U.S. Intelligence Community Capabilities for Handling of Intelligence Information; USIB D-39 7/11).

4. The program of An/ORD has been responsive to the aforementioned challenges. Some general comments concerning program rationale are in order before the details of the program are reviewed. The basic goal of the An/ORD program is to develop procedures and techniques which allow more intensive intelligence analysis, interpretation and production with greater speed and efficiency and with the use of less manpower. The underlying technical basis of the program is the rapidly developing state-of-the-art in computer technology and associated peripheral equipment. Increased computing and processing power, lower computing costs and increasing accessibility of machine capabilities for the intelligence analyst and user are available in the current technology and much more is to come. To achieve operational intelligence systems with the newly available technology requires intensive development effort concerned with machines, procedures and data characteristics as well as the requirements of the human analyst. Complex and difficult problems exist at the interfaces between these components. The An/ORD program is focussed largely on these interface problems.

5. Perhaps the most important aspect of the An/ORD program to date has been the planning and implementation of the Intelligence Processing Research and Development facility (IPRD). This facility (initially called Intelligence Sciences Laboratory) was formally proposed in August, 1965 (Ref. ORD-2227-65). The facility is designed to provide a focus for:

a. the development of specialized procedures, equipment and techniques for intelligence processing.

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b. the integration of components and procedures into operational subsystems.

c. testing of subsystems with real intelligence data.

d. the generation of experience, know-how and technical specifications essential for planning and implementation of large operational systems.

Planning and design of the facility were completed in July 1966, and appropriate approvals obtained to proceed with its implementation. Delivery of IPRD equipment commenced in late 1966. On 17 November 1966 [redacted] was appointed Laboratory Director, IPRD and [redacted] was appointed Assistant Laboratory Director (ref. ORD general notice number 8, 17 November 1966). The missions and functions of the IPRD are delineated in ORD general notice number 7. Further historical details concerning the IPRD are outlined in a separate memorandum. 25X1A9a 25X1A9a

6. Initially the An/ORD program was divided into the following technical areas:

a. Operations and Systems Research
b. R&D on Man-Machine Processes
c. R&D on Language and Text Processes
d. R&D on Speech Processes
e. R&D on Pattern Recognition
f. R&D on Automata Self Organizing and Adaptive Processes

The program objectives under each of these areas are delineated in ORD-2227-65, dated 11 August 1965. The program was later structured along the following lines in accordance with DD/S&T long range plans: Research and Development - Processing and Analysis.

a. Pattern Recognition, Perception, and Readout
b. Information Transformation and Translation

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c. Storage, Retrieval and Correlation
d. Analysis and Prediction of Information
e. Communication and Display of Information
f. Screening and Control of Data at Source
g. Automata and Adaptive Processes

The R&D goals for each of these areas are contained in the DD/S&T long range plan.

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The An/ORD FY66 budget increased to [redacted] Speech processing R&D was significantly expanded with the initiation of programs in speech

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intelligibility enhancement and key-word extraction from continuous speech. The speech processing program is targeted against CS and FBIS requirements. Project action was begun in predictive analysis techniques, and on-line processing design and programming.

A major portion of An/ORD's activity in FY66 was directed toward the planning and design of the Intelligence Processing R&D (IPRD) Facility. In addition the following specific accomplishments can be reported.

a. Preliminary testing for a man-machine facial-recognition system was begun.

b. The feasibility of recognizing key words in continuous speech in a speaker-independent fashion was demonstrated.

c. An extensive analysis was made of a FMSAC data base in order to determine the manner in which it could be input to a predictive modeling program (evolutionary programming).

d. A project involving the ORR/MD data base was initiated. The project goal is to develop data processing tools to aid the ORR analyst in particular and the Agency analyst in general.

e. Final construction of a ground-based 10 mc recorder-reproducer was initiated. Final construction of a 50 mc airborne recorder, 50 mc ground-based readout was initiated. These programs are funded by the [redacted] 25X1A12a

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f. Two of the most promising approaches to very high density audio recording were identified and R&D contracts initiated.

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During FY66 DCI approval was requested and obtained for purchase of processing equipment for the IPRD facility (ref. DD/S&T - 3035-66). The date of the formal authorization of the IPRD equipment and facility was 1 August 1966.

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[redacted]

The Analysis division FY67 budget totaled [redacted] of which approximately 1/3 was utilized for IPRD equipment purchases and rentals and the remainder for external contract actions. During this period the bulk of the IPRD equipment was installed and debugged. The division was reorganized as indicated in the attachment.

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Spheres of activity for the several areas within An/ORD are outlined below.

Program Area A

ORGANIZING, SEARCH AND MODELLING PROCESSES

1. Computer On-Line Processes for Analysis

Design of Integrated On-Line Processes
Textual Analysis - Text Editing
System design and security requirements
Low-cost terminals, CRT's

2. Storage & Retrieval Processes for Text and Formatted Data

File input and update methods
Indexing and Representation Methods
File Organization - Data Structuring

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File querying, Retrieval and Search Methods
Associative Processing Methods
On-Line analysis of large formatted data bases

3. Mathematical Modelling - Prediction Analysis

Predictive Modelling Methods
Early Warning Indicators
Econometric Models
Statistical and Mathematical Modelling Methods

4. Systems Design & Simulation

Intelligence Process Model
Systems simulation - support for [redacted] 25X1A2d2
Design of satellite "stand-alone" processing systems

5. Machine-Aided Translation

6. Computer-Aided Instruction

Program Area B

GRAPHIC AND DISPLAY PROCESSES

1. On-Line Processing System for Graphic Data

Integrated on-line processing module for graphic data analyst
Program-controlled scanning methods
High speed graphic processing methods
Graphic languages and representation of graphic structures

2. Pattern Recognition Methods for Graphic Data Processing

Target detection-change detection methods
Recognition methods for personal identification from graphic data, facial recognition, handwriting recognition

Recognition processes for stereo graphic input data
Automata theory and application

3. Display and Transmission of Graphic Data

Cost, bandwidth, speed, and resolution factors for graphic data transmission
Experimental graphic transmission subsystem
High resolution graphic output for digital computer systems
Video technology for graphic processing; digital-video interface
Display multiplexing technology
Computer-controlled 3-dimensional display

4. Advanced Methods for Data Storage and Retrieval

Multiple-image storage
High-density recording methods
Wide-band thermoplastic recording
Novel photosensitive materials

Program Area C

SPEECH, ANALOG, AND WAVEFORM PROCESSES

1. Speech Processing

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2. Automated Pattern Recognition and Adaptive Control

Design and development of new methods for feature generation classification, recognition decision logic

Application and testing of learning and adaptive control methods
Evaluation and testing of methods, systems, and equipment for pattern recognition
Signature determination methods
On-line recognition methods for waveform signals

3. Security Systems - Processing and Control

Evaluation and specification of equipment methods and systems in support of O/Security requirements
Intrusion alarm systems
Security badge system

4. Recording Methods and Equipment

Evaluation and testing of methods and equipment
Liaison with developments and standardization in the community

5. Analysis and Interpretation Methods for Analog and Waveform Data: Audio, Acoustic, Seismic, EEG, Polygraph, etc.

Development of on-line analysis processes
Transformational analysis methods
Non-parametric processing
Design and development of methods and equipment for analysis
Experimental processing for data and requirements of in-house operations: O/COMMO, OEL, FMSAC, ORD, DD/P Components

During this period, in-house work was begun on the application of machine-assisted processes to problems of intelligence interest. The following representative accomplishments can also be listed.

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Chief, Analysis
ORD/DD/S&T